

WE CLAIM

1. A security system for a protected object, the system comprising a security controller and a plurality of signal transmitters associated with the protected object, and a portable transponder, wherein the transmitters are arranged in use to transmit a challenge signal, the transponder is arranged to receive the challenge signal from said transmitters and to transmit in response thereto a response signal which includes a vector quantity, the transponder is further arranged to measure vector information relating to the vector quantity, and to vary its response depending on vector information, and the controller defines predetermined criteria and is arranged to determine from the response of the transponder whether the vector information meets said criteria, and to perform a security function only if the criteria are met.
2. A system according to claim 1 wherein the vector quantity is a field having a magnitude and a direction, and the vector information relates to the direction of the field.
3. A system according to claim 1 wherein the vector quantity has a number of components, and the vector information comprises at least one component of the vector quantity.
4. A system according to claim 1 wherein the challenge signal includes a vector component from each of a plurality of the transmitters, and the vector information comprises the relative directions of said components.
5. A system according to claim 1 wherein the challenge signal includes a vector component from each of a plurality of the transmitters and the vector information comprises the relative strengths of the components.

6. A security system according to claim 1 wherein the transponder is arranged to relay said vector information to the security controller and the security controller is arranged to determine from the vector information whether the criteria are met.
7. A security system according to claim 1 wherein the transponder is arranged to determine from the vector information whether the criteria are met, and to vary its response depending on whether they are.
8. A security system according to claim 1, wherein the transponder has a position relative to the protected object, the vector information is indicative of said position, the controller defines a range of positions, and the criteria comprise the vector information being consistent with the transponder position being within said range.
9. A security system according to claim 8, wherein the security controller has defined therein a vector map of an area associated with the protected object, the map containing the vector information consistent with the transponder being at various positions within the area, and the controller is arranged to carry out a comparison between the vector information of the challenge signal and the vector information of the map.
10. A security system according to claim 1, wherein the transmitters are arranged in groups, each group comprising at least two transmitters located substantially together in different orientations.
11. A security system according to claim 10 wherein said orientations are mutually orthogonal.
12. A system according to claim 1 wherein the challenge signal comprises a plurality of components from different ones of the transmitters, the components having

relative strengths which are arranged to vary with time during transmission of the challenge signal.

13. A system according to claim 12 wherein the criteria comprise the vector information varying in a way consistent with the varying in the relative strengths of said components.
14. A security system according to claim 1, wherein the transponder comprises a plurality of sensors arranged to detect different components of the challenge signal.
15. A security system according to claim 14 wherein said components are substantially mutually orthogonal.
16. A security system according to claim 14 wherein the sensors comprise inductive coils.
17. A security system according to claim 14 wherein said sensors comprise Hall effect transducers.
18. A security system according to claim 14 wherein the transponder further comprises a calibration transmitter arranged to transmit a signal at a known orientation relative to said sensors so as to enable calibration of the sensors.
19. A system according to claim 1 wherein the object is a vehicle.
20. A system according to claim 19 wherein the security function comprises allowing access to the vehicle.

21. A system according to claim 20 wherein the vehicle has a plurality of closures, wherein the system further comprises a plurality of sensors each associated with a respective one of the closures and arranged to sense an attempt by a user to open the respective closure, the security controller is arranged to issue the challenge signal in response to such an attempt, and the criteria vary depending on which closure the user is attempting to open.
22. A system according to claim 19 wherein the security function comprises enabling the vehicle to start.
23. A system according to claim 22 wherein the criteria comprise the vector information being consistent with the transponder being inside the vehicle.